SHS homework 3: pitch measurement and manipulation

Part 1: pitch measurement

Use your sentence from homework 1 ("Er was eens een oud kasteel midden in een diep en donker bos"). Select the sound, click **View & Edit** and, in the **Pitch** menu of the Sound window, click **Show pitch** to show the blue pitch curve (if not already visible); hide the Spectrum, Intensity, Formants, and Pulses. The pitch is now shown as a blue discontinuous line. The parts that do not show up are considered voiceless. Open the **Pitch** menu and select **Pitch settings...**. Use the standard settings with the meanings as explained in the **Sound: To Pitch (ac)...** command (Praat manual under Help). The pitch algorithm is explained in Weenink chapter 5 (and originally in Boersma 1993).

3.1. What influence does the Pitch range have on the voiceless decision? For instance, if you increase the lower value to 200 Hz, does the voiceless stretch increase or decrease? Please explain.

3.2. Use the standards **Pitch settings...** again, and now open **Advanced pitch settings...**. What happens to the pitch if you increase the **Silence threshold**? Please explain.

3.3. Explain the influence of the **Voicing threshold** on the pitch curve.

3.4. Make a picture with the sound on top and the pitch contour below it. For instance, select the top 3 inches of the Picture window (e.g. 6 inches wide), and draw the Sound there (e.g. with **Draw visible Sound...**); then select a lower band of the Picture window (e.g. between 3 and 6 inches), and draw the Pitch there (e.g. with **Draw visible pitch contour...**, switching off **Erase first**). The select the while picture (e.g. all of its 6 inches of height), and copy–paste that to your Word document or save it to PDF and include it into your LaTeX document (please not a screen dump).

Part 2: pitch manipulation

We now try to improve the concatenative synthesis that you used in homework 1.10. One of the things that gave a poor listening experience with the synthesized sentences was their unnatural pitch. If we could make the pitch contour more similar to the intonation of natural speech, our listening experience might improve. To try this, we use Praat's *Manipulation window* to modify the pitches in the synthesized sounds. Because we do not know in advance what the pitches of these sentences should be, we use the following trick: we first pronounce the sentences ourselves and then try to copy our pitches onto the synthesized utterances. In other words, you use your own utterances as examples.

3.5. Make a recording of the following sentences with your own voice.

Recording *ra*: In een diep en donker bos was eens een oud kasteel.
Recording *rb*: In een diep bos was een kasteel.
Recording *rc*: Er was eens een bos.
Recording *rd*: Midden in een bos was een kasteel.

3.6. Concatenative synthesis. If you already did this in assignment 1 then you are done with this part. If you did not, then do part 1.10 and construct the four sentences above by concatenation of words from the "Er was eens een oud kasteel midden in een diep en donker bos" sentence. Let us refer to these synthesized sentences as *sa*, *sb*, *sc* and *sd*.

3.7. For all synthesized sentences we do the following. Let us take *sa* as an example:

a. Perform a pitch analysis on the corresponding sentence *ra*, either with **Sound: To Pitch (ac)...** (under **Periodicity analysis** in the Objects window) or with **Extract visible pitch contour** (in the Sound window). The resulting Pitch object is our example pitch.

b. Create a manipulation object from your *synthesized* sound *sa*. See Help > Praat Intro > Intro 8. Manipulation (it involves clicking **To Manipulation...** at some point).

c. Do **View & Edit** on the Manipulation object. A Manipulation window (ME) appears (read the **ManipulationEditor** help).

d. Stylize the Pitch in the Manipulation window (Pitch > Stylize Pitch (2 st)). After stylizing you can always add or remove pitch points later if you need them.

e. Play around with manipulating the pitch in the ME. You will notice that you can make funny voices. If you see obvious errors in the pitch contour, try to correct them. For example, unwanted octave jumps might occur near noisy parts, or parts of fricatives might accidentally turn out to be voiced, and so on.

f. Manipulate the pitch in the ME until it more or less resembles your pitch found in **3.5**.

g. Make a picture of the ME and include it in your report.

h. From the **File** menu in the ME, choose **Publish resynthesis**.

i. Submit on Canvas, with picture and sound included. Did manipulation improve synthesis?